

# Macroeconomic Activity Module

The Macroeconomic Activity Module (MAM) represents the interaction between the U.S. economy as a whole and energy markets. The rate of growth of the economy, measured by the growth in gross domestic product (GDP) is a key determinant of the growth in demand for energy. Associated economic factors, such as interest rates and disposable income, strongly influence various elements of the supply and demand for energy. At the same time, reactions to energy markets by the aggregate economy, such as a slowdown in economic growth resulting from increasing energy prices, are also reflected in this module. A detailed description of the MAM is provided in the EIA publication, *Model Documentation Report: Macroeconomic Activity Module (MAM) of the National Energy Modeling System*, DOE/EIA-M065(2006), (Washington, DC, January 2006).

## Key Assumptions

The output of the U.S. economy, measured by GDP, is expected to increase by 3.0 percent between 2004 and 2030 in the reference case. Two key factors help explain the growth in GDP: the growth rate of nonfarm employment and the rate of productivity change associated with employment. As Table 3 indicates, for the Reference Case GDP growth slows down in each of the periods identified, from 3.3 percent between 2004 and 2010, to 3.0 percent between 2010 and 2020, to 2.8 percent in the between 2020 and 2030. In the near term from 2004 through 2010, the growth in nonfarm employment is low at 1.3 percent compared with 2.4 percent in the second half of the 1990s, while the economy is expected to experiencing relatively strong productivity growth of 2.1 percent. Over the forecast period, nonfarm employment is expected to grow by 1.1 percent per year. Nonfarm employment, a measure of demand for nonfarm labor, is generally more volatile than the labor force, a measure of labor supply. The latter depends upon the forecast of population and labor force participation rate. The Census Bureau's middle series population projection is used as a basis for population growth for the AEO2006. Total population is expected to grow by 0.8 percent per year between 2004 and 2030, and the share of population over 65 is expected to increase over time. However, the share of the labor force in the population over 65 is also projected to increase in the forecast period.

**Table 3. Growth in Gross Domestic Product, Nonfarm Employment and Productivity**  
 (Percent per Year)

Assumptions	2004-2010	2010-2020	2020-2030	2004-2030
<b>GDP (Billion Chain-Weighted \$2000)</b>				
High Growth	3.9	3.5	3.3	3.5
Reference	3.3	3.0	2.8	3.0
Low Growth	2.6	2.5	2.1	2.4
<b>Nonfarm Employment</b>				
High Growth	2.1	1.2	1.3	1.4
Reference	1.3	1.0	1.1	1.1
Low Growth	0.5	0.7	0.8	0.7
<b>Productivity</b>				
High Growth	2.5	2.9	2.7	2.7
Reference	2.1	2.4	2.3	2.3
Low Growth	1.8	1.9	1.8	1.8

Source: Energy Information Administration, AEO2006 National Energy Modeling System runs: AEO2006.d111905a; lm2006.d111305a; and hm2006.d112506b.

To achieve the reference case's long-run 3.1 percent economic growth, there is an anticipated steady growth in labor productivity. The improvement in labor productivity reflects the positive effects of a growing capital stock as well as technological change over time. Nonfarm labor productivity is expected to diminish from its current high level to a more sustainable level between 1.8 and 2.6 percent for the remainder of the forecast period from 2005 through 2025. Business fixed investment as a share of nominal GDP is expected to grow over time. The resulting growth in the capital stock and the technology base of that capital stock helps to sustain productivity growth of 2.2 percent from the 2003 to 2025.

To reflect the uncertainty in forecasts of economic growth, the *AEO2005* forecasts use high and low economic growth cases along with the reference case to project the possible impacts on energy markets. The high economic growth case incorporates higher population, labor force and productivity growth rates than the reference case. Due to the higher productivity gains, inflation and interest rates are lower compared to the reference case. Investment, disposable income, and industrial production are increased. Economic output is projected to increase by 3.6 percent per year between 2003 and 2025. The low economic growth case assumes lower population, labor force, and productivity gains, with resulting higher prices and interest rates and lower industrial output growth. In the low economic growth case, economic output is expected to increase by 2.5 percent per year over the forecast horizon.